LANSCE
Los Alamos Neutron Science Center

Research Proposal for the use of Neutron Science Facilities

☐ **Fast Access** ☐ **Joint CINT Proposal**

Proposal Number: 20111535
Submission Number: S1543
Date Received: 03/09/11

Program Advisory Subcommittee: Defense-related Nuclear Science
Focus Area:

Flight Path/Instrument: 1FP14 / DANCE
Estimated Beam Time (days): 19.62
Days Recommended: 0
Dates Desired: BEginning of run period
Impossible Dates:

TITLE
DANCE Development and Turn-On 2011

☐ Continuation of Proposal #:

☐ Ph.D Thesis for:

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RESEARCH AREA

- ☐ Biological and Life Science
- ☐ Chemistry
- ☐ National Security
- ☐ Earth Sciences
- ☐ Engineering
- ☐ Environmental Sciences
- ☒ Nuc. Physics/chemistry
- ☐ Astrophysics
- ☐ Few Body Physics
- ☐ Fund. Physics
- ☐ Elec. Device Testing
- ☐ Dosimetry/Med/Bio
- ☐ Earth/Space Sciences
- ☐ Materials Properties/Test
- ☐ Other:
- ☐ Mat'l Science (incl Cond Matter)
- ☐ Medical Applications
- ☐ Nuclear Physics
- ☐ Polymers
- ☐ Physics (Excl Condensed Matter)
- ☐ Instrument Development
- ☐ Neutron Physics
- ☐ Fission
- ☐ Reactions
- ☐ Spectroscopy
- ☐ Nuc. Accel. Reactor Eng.
- ☒ Def. Science/Weapons Physics
- ☐ Radiography
- ☐ Threat Reduction/Homeland Sec.
- ☐ Other:

FUNDING AGENCY

- ☐ DOE/BES
- ☐ DOE/OBER
- ☒ DOE/NNSA
- ☐ DOE/NE
- ☐ DOE/SC
- ☐ DOE/Other
- ☐ DOD
- ☐ NSF
- ☐ Industry
- ☐ NASA
- ☐ NIH
- ☐ Foreign:
- ☐ Other US Gov't:
- ☐ Other:

PUBLICATIONS

Publications:

None

Abstract: S1543_DANCEDevelop.doc

By electronic submission, the Principal Investigator certifies that this information is correct to the best of their knowledge.

Safety and Feasibility Review *(to be completed by LANSCE Instrument Scientist/Responsible)*

☐ **No further safety review required** ☐ **To be reviewed by Experiment Safety Committee**

☐ **Approved by Experiment Safety Committee, Date:**

Recommended # of days:	**Change PAC Subcommittee and/or Focus Area to:**	**Change Instrument to:**

Comments for PAC to consider:

Instrument scientist signature: **Date:**

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DANCE Development and Turn-On 2011

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A total of 19.62 days of development time is requested for the DANCE detector on FP-14 at the Lujan Center. This development time is requested for "housekeeping" runs that must be made to calibrate the DANCE detector and insure that it is working properly, as well as to investigate problems and make measurements that are common to all DANCE experiments. These tasks must be done with a "good" beam tune to target 1. The specific areas of development are summarized below. Most of Item A must be run at turn-on, items B,C, and D can be done anytime but are best run at turn-on.

A. Turn-on Tests and Calibrations (6.12 days)
The turn-on tests will consist of measuring beam images for alignment and general check-out of the data acquisition. Two days are allocated for this. This will be followed by common "background" runs with shutter closed, no target, ^{56}Fe, and ^{208}Pb. We estimate that 1 day for each will be required for good statistics. We include a "shutter closed" run this year to evaluate the external neutron background, which has been a major source of background.

B. Neutron flux measurements (5.0 days)
We will check the calibration of the flux monitors by using Au "saturated resonance" measurements with a thick Au target and by Au activation with a thin Au target. The saturated resonance measurement will also double as a black-resonance estimate of background, and will require 8 hours of beam. The Au activation irradiation will double as a standards target for estimation of resonance-broadening parameters, and will require about 24 hours for adequate statistics. The Au irradiation must also be done with a Cd filter (about 12 hours). The Cd filter will also double as a black resonance filter. Finally, we are requesting two days of beam to repeat the comparison of our flux measurements to the Lujan center's measurements.

C. Black resonances and Moderator Function (4.0 days)
We will use several black-resonance runs to estimate the monitor background and to calibrate the time offsets in the acquisition electronics. We need good statistics on Bi to clearly see the high-energy dips which are best for determining time offsets and for estimating backgrounds at high (keV) energies. We will use a thick Mn filter, and perhaps one other, to estimate backgrounds at lower energies. Next we will determine the moderator resolution function by comparing the measured shapes of known resonances to the "evaluated" shapes at high and low beam energies. A Cu or ^{92}Zr target will also be used for measuring the moderator resolution function at high (kev range) energies, and a ^{238}U or Au target at lower energies. Again, good statistics are required.

D. Miscellaneous (4.5 days)
There are two miscellaneous tests. First, we will use one day of beam to test the Pb shielding configuration that will be used later in the ^{173}Lu capture experiment. Next, we will use a thin plastic scintillator to try to gain information on the short-time beam and background composition. Finally, we are requesting two additional days of beam to address issues that we have not anticipated. This time will be turned over to an experiment if it is not needed.

DANCE Development 2011

A. Turn-on Tests and Calibrations		**6.12**	**Days**
Beam images (incl Cd)		0.12	
General check-out of DAQ		2.00	
Background runs			
	Target out	1.00	
	Shutter Closed	1.00	
	Fe-56	1.00	
	Pb-208	1.00	
B. Neutron flux measurements		**5.00**	**Days**
Au saturated resonance		0.50	
Au Activation		1.50	
Au target - TOF		1.00	
Comparison to Lujan monitors		2.00	
C. Black resonances and Moderator Function		**4.00**	**Days**
Bi		1.00	
Cu		1.00	
Mn - thick		0.50	
U or Au		1.00	
^{92}Zr			
D. Miscellaneous		**4.50**	**Days**
^{173}Lu Collimator/shielding tests		1.00	
Thin scintillator, fast backgrounds		1.50	
Contingency		2.00	
TOTAL REQUEST		**19.62**	**Days**